

CLAIMS

1. A method for controlling speed of an engine having at least one cylinder, the engine also having an  
5 intake manifold and an outlet control device for controlling flow from the intake manifold into the cylinder, comprising:

generating a desired engine speed; and  
changing the outlet control device to control  
10 the engine speed to said desired engine speed.

2. The method recited in Claim 1 wherein the engine further comprises an inlet control device for controlling flow into the intake manifold, wherein said  
15 changing step further comprises changing both said inlet control device and the outlet control device in response to a respective outlet control device command and an inlet control device command.

20 3. The method recited in Claim 2 wherein said changing step further comprises the steps of:

determining said outlet control device command based on a difference between said desired engine speed and the engine speed; and

25 determining said inlet control device command based on said difference.

4. The method recited in Claim 2 wherein said changing step further comprises the steps of:

30 determining said outlet control device command based on a difference between said desired engine speed and the engine speed; and

determining said inlet control device command based on said outlet control device command.

5. The method recited in Claim 1 wherein said changing step further comprises determining a desired change in the outlet control device to produce a desired engine torque.

10. The method recited in Claim 2 wherein said inlet control device is a throttle and the outlet control device is a variable cam timing actuator.

15. A method for controlling speed of an engine having at least one cylinder, the engine also having an intake manifold and an outlet control device for controlling flow from the intake manifold into the cylinder and an inlet control device for controlling flow into the intake manifold, comprising:

20. generating a desired engine speed; and changing both the outlet control device and the inlet control device based on the engine speed and said desired engine speed and in response to a respective outlet control device command and an inlet control device command.

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8. The method recited in Claim 7 wherein said changing step further comprises the steps of:

determining an engine speed error between said desired engine speed and the engine speed;

30. filtering said engine speed error; determining an intermediate inlet control device command based on said filtered engine speed error;

determining an intermediate outlet control device command based on a nominal desired outlet control device position and an actual outlet control device position;

5 determining said outlet control device command based on said intermediate outlet control device command and said speed error; and

10 determining said inlet control device command based on said intermediate inlet control device command and said engine speed error.

9. The method recited in Claim 7 wherein said changing step further comprises the steps of:

15 determining an engine speed error between said desired engine speed and the engine speed;

determining a desired cylinder charge based on said engine speed error; and

20 determining said inlet control device command and said outlet control device command based on said desired cylinder charge.

10. The method recited in Claim 9 wherein said inlet control device is a throttle.

25 11. The method recited in Claim 9 wherein said outlet control device is a variable cam timing actuator.

12. The method recited in Claim 9 wherein said outlet control device is a swirl control valve.

30 13. The method recited in Claim 9 wherein said inlet control device is an idle air bypass valve.

14. The method recited in Claim 7 wherein said inlet control device and said outlet control device are changed to affect flow in similar directions to control engine speed.

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15. The method recited in Claim 14 further comprising the step of changing said inlet control device and said outlet control device to affect flow in opposite directions to avoid disturbing engine torque in response  
10 to a desired outlet control device setpoint.

16. The method recited in Claim 14 further comprising the step of changing said inlet control device and said outlet control device to affect flow in opposite  
15 directions to avoid disturbing engine speed in response to a desired outlet control device setpoint.

17. An article of manufacture comprising:  
a computer storage medium having a computer  
20 program encoded therein for controlling an engine speed,  
the engine having at least one cylinder, the engine also  
having an intake manifold and an outlet control device  
for controlling flow from the intake manifold into the  
cylinder, said computer storage medium comprising:  
25 code for generating a desired engine speed; and  
code for adjusting the outlet control device to  
control the engine speed to said desired engine speed.

18. The article recited in Claim 17 wherein  
30 the engine further comprises an inlet control device for  
controlling flow into the intake manifold, the article  
further comprising code for adjusting both the inlet

control device and the outlet control device to control  
the engine speed to said desired engine speed.

19. The article recited in Claim 17 wherein  
5 said inlet control device is a throttle and the outlet  
control device is a variable cam timing system, the  
article further comprising:

code for adjusting the inlet control device and  
the outlet control device to affect flow in similar  
10 directions in response to an engine speed error; and

code for adjusting the inlet control device and  
the outlet control device to affect flow in opposite  
directions in response to an outlet control device  
setpoint error.